



# Space Day: Prospecting for Knowledge

## 5-Alka Rockets – Teacher Page

**Purpose:** To design a paper rocket propelled by alka seltzer and water to demonstrate Newton's third law of motion.

**Background:** The paper rocket in this activity is propelled according to the principle stated in Isaac Newton's third law of motion: "For every action there is an opposite and equal reaction." Gas pressure builds inside the film canister due to the mixing of alka seltzer and water. This action continues until enough pressure builds to blow apart the canister from its lid. The reaction is the launch of the rocket.

**Materials:** index card (5 x 8 in.); empty film canister with lid that snaps inside; markers, crayons, or colored pencils; tape; scissors; Alka Seltzer tablets; water; metric tape measure or meter sticks

**Preparation:** Review and prepare materials. It is most important to use film canisters with lids that snap inside. Do not use lids that close around the outside of the canister.

**In Class:** This is an outdoor activity. If gusty winds are a problem, then place a quarter in the canister to keep the rocket from falling over. Launching near a wall where a metric tape has been hung or where meter sticks have been stacked may make it easier to judge how high the rocket goes. You may want to require students to wear safety glasses during this experiment as a general safety precaution. Everyone should stand away from loaded rockets when they are on the launch pad. It may take 15 to 20 seconds to build up enough pressure to launch, so a loaded rocket should not be approached prematurely. These rockets can shoot 5 meters or more into the air. No sharp objects should be placed on top of the nose cone or elsewhere on the rocket.

**Wrap-up:** One way to record the results of different "fuel" mixtures is to make a simple graph of height vs. amount of water. Such a graph gives a clear, visual record of the observations and can be used as evidence to support interpretations.

**Extensions:** Design and launch a rocket powered by two, three or more film canisters. Design a two-stage rocket. In each case, the students will need to work cooperatively to use the knowledge they've gained to solve problems of fuel mixtures and timing.



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## 5-Alka Rockets – Student Page

**Purpose:** To design a paper rocket propelled by alka seltzer and water to demonstrate Newton's third law of motion.

### Procedure:

1. Decorate the index card. This will form the body of your rocket.
2. Roll the index card into an 8-inch-tall tube. Slide an empty, film canister into the tube so that the canister opens at one end of the tube. Securely tape the paper tube to the canister. You do not want these two parts to separate.
3. Now tape the 8-inch-long seam of the paper tube.
4. Cut two triangular, paper fins and tape them onto the rocket.
5. What is the function of the rocket fins?
6. Make a small paper cone and tape it to the top of the rocket if you would like a nose cone.
7. What is the function of the nose cone?
8. Hold the rocket upside down and add water to the canister to one-quarter full.
9. Add half a tablet of alka seltzer to the film canister and quickly snap on the lid.
10. Place the rocket on the ground, lid down. Stand back and count down while you are waiting for launch!

### Observations:

1. How high did the rocket go?
2. What happened when the alka seltzer was added to the water?
3. What action happened inside the film canister?
4. What was the reaction of the rocket?
5. Experiment using different amounts of water or alka seltzer to see how it affects the height of the rocket.



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6. Experiment to see how the weight of the rocket affects the height it travels keeping the amount of water and Alka Seltzer constant each time.

**Interpretations:** What is the best combination of alka seltzer and water to produce the maximum launch height? What is your evidence?